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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/476,092	01/03/2000	DAVID F. SORRELLS	1744.0250001	7304

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EXAMINER

MEHRPOUR, NAGHMEH

ART UNIT	PAPER NUMBER
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2686

DATE MAILED: 06/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/476,092

**Applicant(s)**

SORRELLS ET AL.

**Examiner**

Naghmeh Mehrpour

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 3/24/04.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) 12-18 and 26-28 is/are allowed.
- 6) ☒ Claim(s) 1-11, 19-25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 16, 20.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination (RCE) under 37 CFR 1.114 was filed in this application on 3/24/04A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/24/04 has been entered.

**Information Disclosure Statement**

2. The information disclosure statement filed reference listed in the information disclosure submitted on 03/25/03, have been considered by the examiner (see attached PTO-1449).

***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 1, 3-5, 19-22**, are rejected under 35 U.S.C. 102(b) as being anticipated by Pardoen (US Patent number 5,483,695).

Regarding **Claim 1**, Pardoen teaches method for down-converting a frequency modulated (FM) signal, comprising (See figure 1) the steps of (1) aliasing the FM signal at an aliasing rate, said aliasing rate being determined by the frequency of the FM signal; (2)

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adjusting said aliasing rate 50 to compensate for frequency changes of the FM signal; and  
(3) outputting, responsive to steps (1) and (2), a demodulated baseband information signal (col 4 lines 57-68, col 5 lines 1-12).

Regarding **Claim 3**, Pardoen teaches adjusting the aliasing rate in accordance with frequency changes of FM signal to maintain the aliasing rate substantially equal to the frequency of the FM signal (col 5 lines 1-29). Another word the first aliasing receives an FM signal and first LO 25 signal. The first LO 23 signal is substantially equal to the frequency of FM signal or a sub-harmonic thereof. The first mixer 25 uses the first LO 23 signal to down-convert the FM signal to a first down converted signal Q. As long as an aliasing rate remains substantially equal to the frequency of an FM signal, the result down-converted signal is substantially a constant level. In the case of zero IF FM receiver circuit 11, the first 25 and second 26 down-converted signals I and Q should generally be constant. The frequency of first local oscillator signal 23 is for example, 150 MHZ, in the case of a VHF selective call receiver. Since 150 MHZ frequency is a FM frequency. Therefore Pardoen does teach a method wherein step (1) comprises: aliasing the FM signal I at an aliasing rate that is substantially equal to a frequency of the FM signal (col 5 lines 1-16).

Regarding **Claim 4**, Pardoen teaches a method further comprising the step of compensating for phase delays to maintain bandwidth and stability (col 6 lines 6-14).

Regarding **Claim 5**, Pardoen teaches a method wherein step (5) comprises: (a) compensating for phase delays to maintain stability by adjusting said control signal to create a compensated control signal 35 (see figure 2 numerals 33, 24,50, col 6 lines 40-

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54); and (b) creating said aliasing signal using said compensated control signal 35 (col 4 lines 55-67, col 5 lines 1-9).

Regarding **Claims 19, 20, 22**, Pardoen teaches a method for directly down converting 25 frequency modulated (FM) signal 22 having a carrier frequency, comprising the steps of: (1) aliasing the FM signal 22 with a first local oscillator 23 (LO) signal to create a first down-converted 25 signal (col 2 lines 51-56), said first LO 23 signal having a first LO frequency and a first LO phase (col 2 lines 56-61); (2) aliasing the FM signal with a second LO 23, 27 signal to create a second down-converted signal 26, said second LO signal having a second LO frequency and a second LO phase 27, 23, wherein said second LO frequency is substantially the same as said first LO frequency, and wherein said second LO phase is shifted relative to said first LO phase (col 2 lines 50-67, col 3 lines 1-19) combining said first down-converted signal and said second down-converted signal to create a converter 28 signal (col 3 lines 5-17); (4) integrating said signal 28 to create a control signal 34, (5) creating an aliasing signal from said control signal 34 (col 3 lines 19-33); and outputting, responsive to steps (1)-(5), a demodulated 33 baseband information signal(see figure 2).

Regarding **Claim 21**, Pardoen teaches a method wherein step (4) comprises the step of: adjusting said control signal 35 to maintain said mixer 28 signal at a value substantially equal to zero (col 7 lines 10-43).

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be

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patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 2, 6, 9-11**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Pardoen (US Patent 5,606,731).

Regarding **Claim 2**, Pardoen fails to teach wherein step (1) comprises: aliasing the FM signal at an aliasing rate that is substantially equal to a sub-harmonic of a frequency of the FM signal 32. Pardoen teaches aliasing occurs when the frequency of the message signal  $A(t)$  exceeds half the intermediate frequency  $IF$ . This limitation may also be described in term of an analog sampling process, where the sample points of the message signal  $A(t)$  and determined by the zero crossing of the analog frequency modulated  $IF$  signal. The information extracted in frequency-modulated signal in the instants at which the samples are taken. In both signals  $I(t)$  and  $Q(t)$  the message signal is sampled at the rate of the intermediate frequency  $IF$ . The moment at which the message signal  $A(t)$  is sampled are exactly between the sample moments between sample moments of  $I(t)$  and  $Q(t)$  the message signal  $A(t)$  is sampled rate of the  $IF$ . The mixer combines the signals  $I(t)$  and  $Q(t)$  to produce the output, which is over sampled of mixer 25. The message signal  $A(t)$  is therefore effectively sampled at twice the rate of the  $IF$  so that the frequency of the message signal  $(t)$  at which aliasing generates the demodulated signal bandwidth is doubled. An FM receiver is thus able to use an  $IF$  of 70 kHz and still be able to modulate 57 KHz subcarried which is the modulated of FM commercial broadcasting. Therefore aliasing will not occurs until the message  $A(t)$  has being twice the 35 KHz distortion limit of the existing FM receivers in order to select the frequency

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be best suit the needs of the circuit for noise reduction and producing better quality circuit (col 4 lines 58-68 col 5 lines 1-10). Therefore, adjusting and simply to change aliasing rate be equal to sub-harmonic of frequency, it would have been obvious to ordinary skill in the art at the time the invention was made to provide above teaching to Pardoen, in order to select the frequency be best suit the needs of the circuit for noise reduction and producing better quality circuit.

Regarding **Claims 6, 10**, Pardoen teaches a method for directly down converting 25 frequency modulated (FM) signal 22 having a carrier frequency, comprising the steps of:

(1) aliasing the FM signal 22 with a first local oscillator 23 (LO) signal to create a first down-converted 25 signal (col 2 lines 51-56) , said first LO 23 signal having a first LO frequency and a first LO phase (col 2 lines 56-61);

(2) aliasing the FM signal with a second LO 23, 27 signal to create a second down-converted signal 26, said second LO 23 plus 90 degrees signal having a second LO frequency and a second LO phase 27, 23, wherein said second LO frequency is substantially the same as said first LO frequency, and wherein said second LO phase is shifted relative to said first LO phase (col 2 lines 50-67, col 3 lines 1-19);

(3) combining said first down-converted signal and said second down--converted signal to create a converter 28 signal (col 3 lines 5-17);

(4) integrating said signal 28 to create a control signal 34;

(5) creating an aliasing signal from said control signal 34 (col 3 lines 19-33); and

(6)outputting, responsive to steps (1)-(5), a demodulated 33 baseband information signal (se figure 2). Pardoen does not teach that by combining the converter 25 and 26, for creating a summation signal, however, Pardoen combining the

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converter 25 and 26 by the third converter 28 in order to produce a control signal (See figure 2, numerals 25, 26, 28, 35, 33, 34), and outputting a demodulated baseband 33 information signal to decoder 34. Since using mixer as well as summer both can adjust the aliasing rate. Therefore, it would have been obvious to ordinary skill in the art at the time the invention was made use mixer instead of summer, in order to provide a receiver for receiving FM signal in which aliasing is adjusted, for the purpose of removing the distortion that is caused by aliasing.

Regarding **Claim 9**, Pardoen teaches a method wherein step (5) comprises: (a) compensating for phase delays to maintain stability by adjusting said control signal to create a compensated control signal 35 (see figure 2 numerals 33, 24, 50)(col 4 lines 1-34); and (b) creating said aliasing signal using said compensated control signal 35 (col 4 lines 57-67, col 5 lines 1-9).

Regarding **Claim 11**, Pardoen teaches adjusting the aliasing rate in accordance with frequency changes of FM signal to maintain the aliasing rate substantially equal to the frequency of the FM signal (col 5 lines 1-29). Another word the first aliasing receives an FM signal and first LO 25 signal. The first LO 23 signal is substantially equal to the frequency of FM signal or a sub-harmonic thereof. The first mixer 25 uses the first LO 23 signal to down-convert the FM signal to a first down converted signal Q. As long as an aliasing rate remains substantially equal to the frequency of an FM signal, the result down-converted signal is substantially a constant level. In the case of zero IF FM receiver circuit 11, the first 25 and second 26 down-converted signals I and Q should generally be constant. The frequency of first local oscillator signal 23 is for example, 150 MHz, in the case of a VHF selective call receiver. Since 150 MHz frequency is a FM frequency.

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Therefore Pardoen does teaches a method wherein step (1) comprises: aliasing the FM signal I at an aliasing rate that is substantially equal to a frequency of the FM signal (col 5 lines 1-16).

7. **Claims 7-8**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Pardoen (US Patent 5,606,731) in view of Mishima et al (US Patent Number 5,600,680). Regarding **Claims 7-8**, Pardoen teaches a method wherein said second LO phase is shifted relative to said first LO phase by an amount that is substantially equal to one-half period of the FM signal. Pardoen does not show that second LO phase shift relative to the first LO by amount of one-quarter. However Mishima shows that second LO phase is shifted relative to said first LO phase by an amount that is substantially equal to one-quarter period of the signal (See figure 1, numerals 12, 15). Therefore, it would have been obvious to ordinary skill in the art at the time the invention was made to use one-half or one-quarter or equal to any multiple of a period of the FM signal plus one-quarter period of the FM signal, in order to provide zero-IF receiver circuit that eliminate the time delay.

8. **Claims 23-25**, are rejected under 35 U.S.C. 103(a) as being unpatentable over Sorrells et al. (US Patent 2003/006890).

Regarding claim 23, Sorrells teaches a down -converter, comprising:

- a first aliasing module (page section ;
- a second aliasing module (page section ;

Sorrells does not specifically mention that a summer coupled to the first and second aliasing modules. However use of a filter is well known to those skilled in the relevant

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art(s). A summer may be designed and made-up from distinct components or it may be coupled to the different components.

Therefore, it would have been obvious to ordinary skill in the art at the time the invention was made by combining the above teaching with Sorrells to couple the summer to the first and the second aliasing modules, in order to provide an output that is the arithmetic sum of modulated signals.

Regarding claim 24, Sorrells teaches a down-converter comprising:

an integrator coupled to the summer 1832 (see figure 18, page 15 section 366);

a voltage controlled oscillator 1806 coupled to the integrator (see figure 18, page 15 section 366); and

a phase shifter coupled to the VCO (see figure 18, page 15 section 366).

Regarding claim 25, Sorrells teaches a down converter comprising: a loop compensation module to the integrator and the voltage controlled oscillator (see figure 18, page 15 section 366).

#### ***Allowable Subject Matter***

9. **Claims 12-18, 26-28,** are allowed.

10. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 12, the present application teaches a first aliasing module and second aliasing module to alias the FM signal and a summing module to combine the first signals and the second signal to create a summation signal as specifically mentioned in claim 12.

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Regarding claim 23, the present application teaches a down converter comprising: a first aliasing module; and a second aliasing module; and a summer coupled to the first and second aliasing modules as mentioned in claim 23.

The closest record of prior art Pardoen teaches an FM receiver comprising a local provides a radio receiver for receiving a selected FM signal in which a message signal  $A(t)$  modulates the frequency of carrier signal, comprising a local oscillator for producing a local oscillator signal, a heterodyning stage for heterodyning said selected FM signal with said local oscillator signal so as to reduce the frequency which is modulated by said message signal to an intermediate frequency, and a demodulator stage for accepting an output signal from said heterodyning stage and extracting said message signal therefrom, characterized in that said heterodyning stage comprises signal producing means for producing  $n$  signals  $a_{sub.1} \dots a_{sub.n}$  wherein each signal consists of said message signal modulated at said intermediate frequency, said signals  $a_{sub.1} \dots a_{sub.n}$  being related by the expression. Pardoen fails to teach a first aliasing module and second aliasing module to alias the FM signal and a summing module to combine the first signals and the second signal to create a summation signal as specifically mentioned in claim 12, and fails to teach a down converter comprising: a first aliasing module; and a second aliasing module; and a summer coupled to the first and second aliasing modules as mentioned in claim 23.

### ***Response to Arguments***

11. Applicant's arguments filed 3/124/04 have been fully considered but they are not persuasive.

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In response to the applicant's argument that nowhere in Pardoen is there any teaching to **adjust** the aliasing rate to compensate for frequency changes of the FM signal.

Examiner disagrees with the applicant's argument, Pardoen teaches a system wherein aliasing occurs when the frequency of the message signal  $A(t)$  exceeds half the intermediate frequency  $f(IF)$ . Unlike normal sampling processes, are extracted in frequency modulated signals, and are not contained in the instantaneous value of the waveform sampled, but in the instants at which the samples are taken (col 4 lines 46-56). Pardoen teaches mixers 28 combines the signal  $I(t)$  and  $Q(t)$  so as to produce at its output over sampled version of the signal from the mixer 25. The message signal  $A(t)$  is therefore effectively sampled at twice the rate of the intermediate frequency  $f(IF)$  so that the frequency of the message signal  $A(t)$  at which aliasing commences, the modulated message bandwidth, is doubled (col 4 lines 62-67). An FM receiver according to Pardoen is thus able to use an intermediate frequency of 70 kHz and still be able to demodulate the RDS signals available in commercial FM broadcasting which are modulated onto 57 kHz subcarrier (col 5 lines 1-5). Above explanation shows that Pardoen's aliasing rate is determined by downconverting the FM signals via mixer 25, and adjusting the aliasing rate to compensate for frequency changes of the FM.

### Conclusion

12. **Any responses to this action should be mailed to:**

Commissioner of Patents and Trademarks

Washington, D.C. 20231

**or faxed to:**

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(703) 872-9314, (for formal communications indented for entry)

**Or:**

(703) 308-6306, (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, Va., sixth Floor (Receptionist).


Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Melody Mehrpour whose telephone number is (703) 308-7159. The examiner can normally be reached on Monday through Thursday (first week of bi-week) and Monday through Friday (second week of bi-week) from 6:30 a.m. to 5:00 p.m.

If attempt to reach the examiner are unsuccessful the examiner's supervisor, Marsha Banks-Harold be reached (703) 305-4379.

NM

June 18, 2004

  
**CHARLES APPIAH**  
**PRIMARY EXAMINER**